CLAIMS

1. A method for detecting changes in inductance of a variable inductance element comprising the steps of:

a) producing an oscillating signal having a frequency that varies in proportion to variations in inductance of the variable inductance element;

b) producing an intermediate analog voltage that varies in proportion to variations in frequency of the oscillating signal of step a);

c) scaling the intermediate analog voltage of step b) to produce an output analog voltage; and

d) detecting changes in inductance of the variable inductance element based upon changes in the output analog voltage of step c).

2. The method of claim 1, wherein the variable inductance element comprises an inductive sensor.

3. The method of claim 2 where the inductive sensor includes at least one coil located adjacent a magnetostrictive object.

4. The method of claim 1, wherein in step a) the oscillating signal is a square wave signal.

5. The method of claim 1, wherein step d) includes inputting the output analog voltage to an analog to digital converter.

6. The method of claim 1, wherein step b) involves inputting the oscillating signal to a phase-locked loop circuit.

7. The method of claim 1, wherein step a) involves connecting the variable inductance element in a feedback path of an oscillator circuit.

8. The method of claim 1 wherein the scaling of step c) involves offsetting and amplifying the intermediate analog voltage.

9. A method of converting a known range of inductance change of a variable inductance element between a first inductance and a second inductance into a desired range of analog voltage change between a first voltage level and a second voltage level, comprising the steps of:

a) establishing an oscillator circuit incorporating the variable inductance element so as to produce an oscillating signal having a frequency that varies with inductance of the variable inductance element, the oscillating signal produced with a first frequency when the variable inductance element has the first inductance and produced with a second frequency when the variable inductance element has the second inductance;

b) establishing a circuit to convert the frequency of the oscillating signal to an intermediate analog voltage, the intermediate analog voltage produced at a first intermediate level when the oscillating signal has the first frequency and produced at a second intermediate level when the oscillating signal has the second frequency; and

c) establishing a circuit to scale the intermediate analog voltage so as to produce an output voltage within the desired range, the output voltage produced at the first voltage level when the intermediate analog voltage is at the first intermediate level and produced at the second voltage level when the intermediate analog voltage is at the second intermediate level.

10. The method of claim 9 wherein the circuit established in step b) is configured such that the first intermediate level is a non-zero level and the second intermediate level is a non-zero level.

11. The method of claim 12, wherein in step b) the established circuit is a phase-locked loop circuit.

12. The method of claim 11, wherein in step b) a range defined between the first intermediate level and the second intermediate level is a substantially linear output range of the phase-locked loop circuit.

13. The method of claim 9, wherein the variable inductance element is connected in a feedback path of the oscillator circuit.

14. The method of claim 9, wherein the first voltage level is about 0 volts and the second voltage level is about 5 volts.

15. A circuit for producing a voltage level substantially proportional to inductance of a variable inductance element, the circuit comprising:

on oscillator stage having the variable inductance element connected therein and producing an oscillating signal having a frequency that varies with inductance of the variable inductance element;

a conversion stage operatively connected to receive the oscillating signal and producing an intermediate analog voltage that varies in proportion to variations in the frequency of the oscillating signal; and

an amplification stage operatively connected to receive the intermediate analog voltage and operating to offset and amplify the intermediate analog voltage to produce an output analog voltage with a voltage level proportional to inductance of the variable inductance element.

16. The circuit of claim 15 wherein the conversion stage comprises a phase-locked loop circuit.

17. The circuit of claim 15 wherein the variable inductance element is connected in a feedback path of the oscillator stage.

18. The circuit of claim 15 wherein the amplification stage includes an adjustable offset control component.

19. The circuit of claim 18 wherein the adjustable offset control component comprises a potentiometer.

20. The circuit of claim 18 wherein the adjustable offset control component comprises an automated control component.